

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

TRANSLATION

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing (day/month/year) **See form PCT/ISA/210**

Applicant's or agent's file reference

307522-1

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/EP2005/050126

International filing date (day/month/year)

13.01.2005

Priority date (day/month/year)

11.02.2004

International Patent Classification (IPC) or both national classification and IPC

F02M59/46, F04B53/10, F16K15/04, F16K15/06

Applicant

ROBERT BOSCH GMBH

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/EP

Authorized officer

Facsimile No.

Telephone No.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2005/050126

Box No. I

Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language
_____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2005/050126

| Box No. V | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | | |
|--------------------------------|--|----------------|-----|
| 1. Statement | | | |
| | Novelty (N) | Claims 1-8 | YES |
| | | Claims | NO |
| | Inventive step (IS) | Claims 2-6 | YES |
| | | Claims 1, 7, 8 | NO |
| | Industrial applicability (IA) | Claims 1-8 | YES |
| | | Claims | NO |
| 2. Citations and explanations: | <p>Reference is made to the following documents:</p> <p>D1: EP-A-1 058 783 (ROBERT BOSCH GMBH) 13 December 2000 (2000-12-13)</p> <p>D2: EP-A-0 516 759 (SAAB AUTOMOBILE AKTIEBOLAG) 9 December 1992 (1992-12-09)</p> <p>1. The present application does not meet the requirements of PCT Article 33(1) because the subject matter of claim 1 does not involve an inventive step under PCT Article 33(3).</p> <p>1.1 D1 is considered the closest prior art to the subject matter of claim 1. D1 discloses (the references between parentheses relate to said document) a high pressure pump, in particular for a fuel injection device of an internal combustion engine, having at least one pump element (16) which has a pump piston (12) which is driven in a reciprocating motion and delimits a pump working space (18) into which fuel is sucked from a fuel supply line via an inlet valve (48) during the suction stroke of the pump piston (12), and out of which fuel is discharged into a high pressure</p> | | |

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2005/050126

Box No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;
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region via an outlet valve (68) during the feed stroke of the pump piston (12), the inlet valve (48) and/or the outlet valve (68) having a valve member (52; 78), a sealing face of which interacts with a valve seat (54; 76) which is arranged in a valve housing, the valve member (52; 78), in the open state, opening a throughflow cross section between the valve member (52; 78) and the valve housing when the sealing face of said valve member (52; 78) is raised up from the valve seat (54; 76).

1.2 The subject matter of claim 1 therefore differs from the known high pressure pump in that, in the open state of the valve member (44; 60), a region (52; 66) with the smallest throughflow cross section between the valve member (44; 60) and the valve housing (40; 36) is arranged downstream of the sealing face (48; 64) of the valve member (44; 60) in the flow direction of the fuel flowing through the valve (30; 32).

1.3 The problem addressed by the present application can therefore be considered that of the outlet valve tending to oscillate as a result of the hydraulic forces generated, resulting in the operating behaviour of the high pressure pump being adversely affected.

1.4 The solution proposed in claim 1 of the present application cannot be considered inventive for the following reasons (PCT Article 33(3)):

WRITTEN OPINION OF THE
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PCT/EP2005/050126

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- 1.5 With regard to the feature of the "displacement of the smallest throughflow cross section being displaced away from the sealing face", D2, column 2, line 41 - column 3, line 21 and figure 2 describes the same advantages as the present application. A person skilled in the art would therefore consider the inclusion of this feature in the high pressure pump described in D1 to be a routine design measure for solving the problem of interest.
2. Dependent claims 7 and 8 do not contain any features which, in combination with the features of any claim to which they refer back, meet the PCT requirements for inventive step, see D2 and the corresponding text passages specified in the search report.
- 2.1 The combination of features contained in dependent claims 2 to 6 is neither known from nor suggested by the available prior art. The reasons are as follows:
- 2.2 Claim 2: the angle of inclination of the second lateral surface relative to the longitudinal axis is less than the angle of inclination of the first lateral surface. As a result, in the open state of the valve member, the region of the smallest throughflow cross section is arranged upstream of the sealing face of the valve seat.

WRITTEN OPINION OF THE
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International application No.

PCT/EP2005/050126

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|-----------|---|
| 2.3 | Claims 3, 5 and 6 are dependent on claim 2 and therefore likewise meet the PCT requirements for novelty and inventive step. |
| 2.4 | Claim 4: the angle of inclination of the lateral surface of the bore section is different to the angle of the sealing face of the valve member, in order to improve the contact between the valve member and the lateral surface. |